



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/743,540	12/23/2003	Hideki Sunaga	074418-0127	5786
22428	7590	07/21/2005	EXAMINER	
FOLEY AND LARDNER SUITE 500 3000 K STREET NW WASHINGTON, DC 20007			HIRUY, ELIAS	
			ART UNIT	PAPER NUMBER
			2837	

DATE MAILED: 07/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/743,540

**Applicant(s)**

SUNAGA ET AL.

**Examiner**

Elias B. Hiruy

**Art Unit**

2837

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on 04 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 6-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

**Information Disclosure Statement**

1. An initialed and dated copy of Applicant's IDS form 1449 is attached along with this final office action as requested by applicant.

**Response to Argument**

2. Applicant's arguments filed on 04/04/05 is received and entered into record.
3. The objection to the specification for various formalistic reasons is withdrawn pursuant to applicant correction of stated objection in the previous office action.
4. Claim 1 rejection based on 35 U.S.C 112 paragraph 2 is withdrawn since the claim is cancelled.
5. Claims 1-3 rejection based on 35 U.S.C 102 (b) is withdrawn as this claims are cancelled.
6. Claims 5 rejection based on 35 U.S.C 103 (a) is withdrawn as this claims are cancelled.
7. Applicant's 04/04/05 new entered claims are fully considered based on their merits and are rejected/objected below.

**Claim Rejections - 35 USC § 112**

- The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 13-21 rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission

Art Unit: 2837

amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

The omitted structural cooperative relationships are:

The new independent claim as claimed does not show how the radio is related with the rest of the structure. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Thus, the claim as claimed is not clear if and how the radio and the motor are related structurally. Even though the specification discloses this relationship, the claims fail to clearly identify the structural limitations as stated in the specification.

9. Claims 11-12, 18-19, and 28-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The applicant recites the limitation "first predetermined rate" in claim 11, 18, and 28, also in claim 12, 19, and 29, the applicant recites the limitation "second predetermined rate." The recitation of the two different predetermined rates is not supported by the specification. The specification shows only one predetermined rate that is used to increase or decrease the duty ratio from the first value to the next or in the reverse order. Accordingly, the prosecution of the office action based on the merit of the claims has continued assuming that what the applicant is referring too by the two predetermined rate is the single rate that is used to increase or decrease the duty ratio.

**Claim Rejections - 35 USC § 103**

- The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

- The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taketomi et al (US 6,288,508) in view of Satoh et al (US 5,600,634).

Satoh et al teaches about a motor controller (unit 100, fig. 14) that is configured to control a motor (35, figure 14). The motor is used for changing position of an air-mixing door of an automotive air conditioner (column 11, lines 43-57).

Although Satoh et al teaches about a motor that is used for an air conditioning door, the disclosure does not fully show how the motor control would have been implemented in the same manner as in this application.

On the other hand, Taketomi et al teaches about an apparatus that meets most of the limitations introduced in claim 6. Taketomi et al apparatus consists a control circuit/device (CPU 23, Fig. 1), a drive circuit (FET drive circuit 34 and FET1-FET4, Fig. 1), an actuator (Column 6, line 22-26), and an electric motor (shunt type motor 11, Fig. 1). The apparatus control circuit/device controls the driving circuit, which is arranged as an H bridge, using pulse width modulation (See Fig. 1). Since both the top and bottom part of the semi-conductors are controlled by a PWM signal, it meets the limitation of claim 1 which states that the bottom portion of the H bridge circuit is being controlled by a PWM signal. Further, the electric motor can be run in the reverse as well as in the forward direction (Column 2, line 39-61) by turning a set of transistor and applying PWM, and this action is fully controlled by the control circuit/device.

Accordingly, it would have been obvious to modify Satoh et al invention to include Taketomi et al method of controlling a motor since both inventions are analogous art drawn to controlling a motor to move an object.

The limitation of claim 7 here in this application falls under the teaching of the aforementioned invention of Satoh et al invention as modified by Taketomi et al since the regenerative process of Taketomi et al invention includes applying PWM signal to the lower arm of the H Bridge (Column 3, line 66-67 and Column 4, line 1-22).

11. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taketomi et al (US 6,288,508 B1) as applied to claim 6 above, in view of Satoh et al (US 5,600,634) further in view of Coles et al (US 6,124,688).

In paragraph 10 above, it is shown how claim 6 limitations were clearly anticipated by the aforementioned invention of Satoh et al as modified by Taketomi et al.

The aforementioned teaching, however, fails to disclose how the control system could switch two different driving modes.

However, Coles et al discloses an apparatus and a method that has two different driving modes the complimentary modulation (i.e. driving pulse) (Column 3, lines 38-46) and the bottom only modulation (i.e. PWM signal applied to the lower arm of the bridge circuit)(Column 3, lines 47-53). The control system is able to select (Column 3, lines 28-36) one of the two methods depending on different conditions. Thus, the teaching of claim 8 in this application fully falls under the Coles et al disclosure.

Accordingly, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the method and apparatus of Coles et al into the aforementioned invention of paragraph 10. The motivation being that using the two modes and selecting one of the two modes to best fit the current situation will enhance the accuracy of the motor torque control irrespective of rotor speed, and it further minimizes the motor torque ripple and acoustic noise from the motor.

Regarding claim 10, the aforementioned invention of paragraph 9 as modified by Coles et al teaching shows how the control system applies the complimentary modulation when there is higher demand for torque, and the bottom only modulation is applied when the motor speed is high enough (Coles et al column 3, lines 57-63). When the torque requirement is increased, the control method of Coles et al selects the complimentary modulation in like manner of claim 10 of this application.

Art Unit: 2837

12. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taketomi et al (US 6,288,508 B1) as applied to claim 6 above, in view of Satoh et al (US 5,600,634) further in view of Kikuchi et al (US 6,208,102).

In paragraph 10 above, it is shown how claim 6 limitations were clearly anticipated by the aforementioned invention of Satoh et al as modified by Taketomi et al.

Regarding claim 11 and 12, the aforementioned teaching, however, fails to disclose how the control the method could increase and decrease a duty ratio of the PWM signal based on predetermined rate.

Kikuchi et al invention shows how the duty ratio of the PWM signal is increased or decreased at a predetermined rate based on the desired goal, running the motor or stopping it (see figure 13 and related discussion) (column 9 lines 10-40 and column 10 lines 26-42).

Thus, it would have been obvious to include in the aforementioned invention the method of varying the PWM signal, by increasing or decreasing the duty ratio at a predetermined rate, as taught by Kikuchi et al to achieve an improved control system with a smoother transient response.

13. Claims 22, 24, and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taketomi et al (US 6,288,508 B1) in view of Kikuchi et al (US 6,208,102).

Regarding claim 22, Taketomi et al teaches about an apparatus that meets most of the limitations introduced in claim 6. Taketomi et al apparatus consists a control circuit/device (CPU 23, Fig. 1), a drive circuit (FET drive circuit 34 and FET1-FET4, Fig.



Art Unit: 2837

1), an actuator (Column 6, line 22-26), and an electric motor (shunt type motor 11, Fig. 1). The apparatus control circuit/device controls the driving circuit, which is arranged as an H bridge, using pulse width modulation (See Fig. 1). Since both the top and bottom part of the semi-conductors are controlled by a PWM signal, it meets the limitation of claim 1 which states that the bottom portion of the H bridge circuit is being controlled by a PWM signal. Further, the electric motor can be run in the reverse as well as in the forward direction (Column 2, line 39-61) by turning a set of transistor and applying PWM, and this action is fully controlled by the control circuit/device.

Taketomi et al does not show how a duty ratio of the PWM signal varies based on a predetermined rate from a first value to as second value.

Kikuchi et al, however, teaches a method of controlling a motor by varying a duty ratio of the PWM signal at a predetermined rate (2%) between a minimum (dmin) and maximum value (dmax) (column 9 lines 10-40 and column 10 lines 26-42).

Thus, it would have been obvious to include in Taketomi et al invention the method of varying the PWM signal as taught by Kikuchi et al to achieve an improved control system with a smoother transient response.

The limitation of claim 24 here in this application falls under the teaching of the aforementioned invention as the inventions incorporates Taketomi et al regenerative process of Taketomi et al invention that includes applying PWM signal to the lower arm of the H Bridge (Column 3, line 66-67 and Column 4, line 1-22).

The claim limitation of claim 28 and 29 are also meet by the aforementioned invention as Kikuchi et al invention shows how the duty ratio of the PWM signal is

Art Unit: 2837

increased or decreased at a predetermined rate based on the desired goal, running the motor or stopping it (see figure 13 and related discussion). Further, as shown above for claim 22 and 24, Taketomi et al teaching includes applying PWM signal to the lower arm of the H Bridge. Hence, the limitations of claim 28 and 29 are fully met by the aforementioned invention of Taketomi et al as modified by Kikuchi et al.

14. Claims 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taketomi et al (US 6,288,508) in view of Kikuchi et al (US 6,208,102), as applied to claim 22 above, and further in view of Satoh et al (US 5,600,634).

Satoh et al teaches about a motor controller (unit 100, fig. 14) that is configured to control a motor (35, figure 14). The motor is used to for changing a position of an air-mixing door of an automotive air conditioner (column 11, lines 43-57).

Although Satoh et al teaches about a motor that is used for an air conditioning door. The disclosure does not fully show how the motor control would have been implemented.

However, the discussion for the aforementioned claim 22 of Taketomi et al as modified by Kikuchi et al has demonstrated to have all of the claim limitation of claim 22.

Accordingly, it would have been obvious to modify Satoh et al invention to include the aforementioned invention method of controlling a motor since both inventions are analogous art drawn to controlling a motor to move an object.

15. Claims 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taketomi et al (US 6,288,508 B1) as applied to claim 22 above, in view of Kikuchi et al (US 6,208,102), further in view of Coles et al (US 6,124,688).

In paragraph 13 above, it is shown how claim 22 limitations were clearly anticipated by the aforementioned invention of Taketomi et al as modified by Kikuchi et al.

The aforementioned teaching, however, fails to disclose how the control system could switch two different driving modes.

However, Coles et al discloses an apparatus and a method that has two different driving modes the complimentary modulation (i.e. driving pulse) (Column 3, lines 38-46) and the bottom only modulation (i.e. PWM signal applied to the lower arm of the bridge circuit)(Column 3, lines 47-53). The control system is able to select (Column 3, lines 28-36) one of the two methods depending on different conditions. Thus, the teaching of claim 8 in this application fully falls under the Coles et al disclosure.

Accordingly, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the method and apparatus of Coles et al into the aforementioned invention of paragraph 13. The motivation being that using the two modes and selecting one of the two modes to best fit the current situation will enhance the accuracy of the motor torque control irrespective of rotor speed, and it further minimizes the motor torque ripple and acoustic noise from the motor.

Regarding claim 27, the aforementioned invention of paragraph 13 as modified by Coles et al teaching shows how the control system applies the complimentary modulation when there is higher demand for torque, and the bottom only modulation is applied when the motor speed is high enough (Coles et al column 3, lines 57-63). When the torque requirement is increased, the control method of Coles et al selects the complimentary modulation in like manner of claim 27 of this application.

**Allowable Subject Matter**

16. Claims 13-21 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

17. Claims 9 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Conclusion**

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. For additional arts cited, refer to the attached PTO-892 form.

**Remarks**

20. No claim is allowed.


**Correspondence**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elias B. Hiruy whose telephone number is 571-272-6105. The examiner can normally be reached on 7:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Martin can be reached on (571) 272-2107. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EH

07/08/05



DAVID MARTIN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800